PATENT ABSTRACTS OF JAPAN

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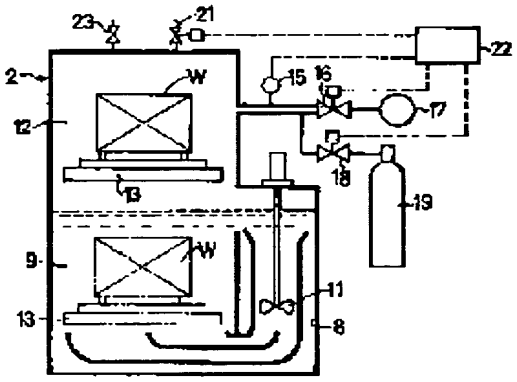
(54) HARDENING DEVICE

(57)Abstract:

PURPOSE: To allow the hardening treatments of different targets without changing the kind of a cooling liquid by controlling the atm. pressure in a hardening chamber at the time of hardening when various kinds of metals are going to be hardened.

CONSTITUTION: A heated metallic member W to be hardened is imposed on an elevator 13 and is carried into the hardening chamber 2. This chamber is maintained in a hermetic state and the inside thereof is evacuated by a vacuum pump 17. The elevator 13 is then lowered to immerse the metallic member W into the cooling agent 9 for hardening in a cooling chamber 8 to harden the member. The metal W to be hardened is subjected to the hardening treatment while the atm. pressure of the hardening chamber 2 communicating with the hardening and cooling chamber 8 is adequately controlled by a program controller 22 inputted with pressure conditions for satisfying the quality required for the above-mentioned member under the opening and closing of a supply valve 18 and a work valve 21. Different hardening effects are obtd. without replacing the cooling agent 9 by the regulation of the of the atm. pressure in the hardening chamber 2 even if the materials of the metal W to be hardened and the physical properties after the hardening treatment are many and diversified.



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CLAIMS

[Claim(s)]
[Claim 1] Quenching equipment with which a quenching coolant tub is prepared in the quenching interior of a room made into sealing structure, and the pressure controller which controls the pressure of the quenching interior of a room is formed in the quenching room.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the quenching equipment which follows the heating apparatus of a metaled thermal treatment equipment, and is installed.
[0002]
[The technical problem which should solve a Prior art and invention] When the processed material to which heat treatment is performed covered many forms conventionally, according to quality, such as construction material of each processed material, a dimension, a configuration, etc. and hardness required of each processed material, a metal texture, the amount of distortion, two or more quenching coolant tubs put into the liquefied cooling agent with which a class differs from temperature are prepared, and it was hardening using the cooling agent according to each processed material.
[0003] However, by the conventional approach, while facility cost and operating cost became high, there was a problem that a big installation tooth space was needed. And in the case of a full automatic line, there was a problem that a conveyance path became complicated.
[0004] Furthermore, since the condition after quenching of a processed material was decided also by the conventional approach according to the class of cooling agent, it had the problem that quality, such as hardness, a metal texture, and the amount of distortion, could not be adjusted delicately, by it. That is, such quality is determined by the cooling curve showing the relation between a cooldown delay and temperature. for example, a continuous line (A) shows to drawing 3 -- as -- the 1st step (X) of cooling **** -- if the steam film of a cooling rate of a cooling agent is late at that of a wrap and subsequently becomes a predetermined characteristic temperature about the whole surface of a processed material -- the 2nd step (Y) The 3rd step (Z) to which it shifts, a cooling rate becomes rapidly large, and cooling goes by the convection current after that Shifting, a cooling rate becomes the slowest (part of C). And the above-mentioned quality changes by changing the time amount of each phase, a cooling rate and initiation, or termination temperature. However, since a cooling curve is decided by the class of cooling agent, it is there where quality, such as hardness, a metal texture, and the amount of distortion, cannot be adjusted delicately, and in order to solve this problem, when it had before **, and the temperature of a cooling agent is changed or ** water solubility cooling agent is used [**** / making ** cooling agent flow by churning or injection], it considers changing that concentration.
[0005] However, by the approach of **, the uniform rate of flow of a cooling agent cannot be acquired, but there is a problem that distortion of a processed material

becomes large. ** By the approach, while requiring long duration for modification of temperature, the problem of receiving a limit is in extent of hardening. ** By the approach, there is a problem that it is the same as changing the class of cooling agent, and cannot respond for every processed material.
[0006] The object of this invention is to offer the quenching equipment which solved the above-mentioned problem.
[0007]
[Means for Solving the Problem] As for the quenching equipment by this invention, a quenching coolant tub is prepared in the quenching interior of a room made into sealing structure, and the pressure controller which controls the pressure of the quenching interior of a room is formed in the quenching room.
[0008]
[Function] The above-mentioned cooling curve can be changed to arbitration, without changing the class of cooling agent, if the pressure of the quenching interior of a room is fluctuated at the time of quenching.
[0009]
[Example] Hereafter, the example of this invention is explained with reference to a drawing.
[0010] Drawing 1 and drawing 2 show one example of the quenching equipment by this invention.
[0011] It is the quenching room (2) which quenching equipment stood in a row in the heat chamber (1) of heating apparatus in drawing 1 and drawing 2 , and was prepared, and was made into sealing structure. It has. heat chamber (1) An outlet (1a) and quenching room (2) an inlet port (2a) and this outlet (2b) -- respectively -- a movable door (3), (4), and (5) It is prepared. Quenching room (2) The movable door (4) prepared in the inlet port (2a) and this outlet (2b) and (5) It is a locking device (6), respectively at the time of closeout. O ring which was pushed against the periphery section of an inlet port (2a) and an outlet (2b), and has been arranged between the periphery sections of an inlet port (2a) and an outlet (2b) at this time (7) Quenching room (2) It considers as sealing structure.
[0012] Quenching room (2) In the inner lower part, it is a quenching coolant tub (8). It is prepared and is a liquefied cooling agent (9) in this. It is put in. quenching coolant tub (8) **** -- cooling agent (9) The agitator (11) made to flow is arranged. moreover -- although the graphic display was omitted -- quenching coolant tub (8) **** -- cooling agent (9) The thermostat is formed. Quenching room (2) Inside, they are up space (12) and a quenching coolant tub (8). The elevator (13) which moves up and down between inside is formed.
[0013] quenching room (2) **** -- quenching room (2) The pressure adjuster which adjusts the pressure in up space (12) is formed. A pressure adjuster is a quenching room (2), as shown in drawing 1 . The pressure sensor which detects the pressure in up space (12) (15), Quenching room (2) The vacuum pump connected through the exhaust valve with an actuator (16) (17), Similarly it is a quenching room (2). It has the high voltage inactive gas holder (19) connected through the inert gas supply valve with an actuator (18), and the leak valve with an actuator (21). The pressure sensor (15), the exhaust valve (16), the inert gas supply valve (18), and the leak valve (21) are connected to the program controller (22). Processed material for which the program controller (22) was beforehand asked with the small experimental device (W) The flow and pressure requirement for obtaining the cooling curve which fulfills demand quality is inputted. in addition, quenching room (2) **** -- the relief valve (23) is prepared.

[0014] such a configuration -- setting -- heat chamber (1) An outlet (1a) and quenching room (2) the movable door (3) of an inlet port (2a), and (4) -- open -- him and heat chamber (1) Processed material (W) set and heated Quenching room (2) It is carried in in up space (12) and is carried on the elevator (13) in a lifting location. And a movable door (3) and (4) are shut and it is a quenching room (2). Inside is made into a sealing condition. Subsequently, an elevator (13) descends and it is a processed material (W). Cooling agent (9) It is immersed in inside. Quenching room (2) Processed material after inside was made into the sealing condition (W) Cooling agent (9) To the back before being immersed in inside, it is a quenching room (2) by the pressure adjuster. Inside is made into a predetermined pressure and predetermined time maintenance is carried out by the pressure. Then, it is based on the conditions beforehand inputted into the program controller (22), and an exhaust valve (16), an inert gas supply valve (18), and a leak valve (21) are opened and closed, and it pressurizes and/or decompresses, and is a quenching room (2). An inner pressure is changed. After cooling is completed, an elevator (13) goes up and it is the movable door (5) of an outlet (2b). It is opened and taken out.
[0015] It sets above and is a quenching room (2). When inside is ordinary pressure (1bar), it is a processed material (W). A cooling curve is a continuous line (A) to drawing 3 . It comes to be shown. Quenching room (2) When inside is pressurized, it is the 1st step (X). While a cooling rate becomes large, it is the 1st step (X). Time amount becomes short and, moreover, it is the 3rd step (Z). A cooling rate becomes small. 2bars And 5bars It is a continuous line (B) about the cooling curve at the time. And (C) It comes to be shown. On the contrary, quenching room (2) When inside is decompressed, it is the 1st step (X). While a cooling rate becomes small, it is the 1st step (X). Time amount becomes long and, moreover, it is the 3rd step (Z). A cooling rate becomes large. 0. 5bar It reaches and is a continuous line (D) about the cooling curve at the time of 0.1bars. And (E) It comes to be shown. and -- until cooling is completed -- quenching room (2) an inner pressure -- an application-of-pressure condition and a reduced pressure condition -- suitable -- union **** -- it becomes possible by adjusting like to change a cooling curve to arbitration in the part which gave hatching of a continuous line to drawing 3 . Therefore, processed material (W) The quality demanded can be given.
[0016] It sets in the above-mentioned example and is a quenching room (2). It is good to connect the by-path pipe to tubing which connects a vacuum pump (17) so that an exhaust valve (16) may be straddled, and to prepare a valve with an actuator with a small capacity in this by-path pipe from an exhaust valve (16). Moreover, quenching room (2) It is good to connect the by-path pipe to tubing which connects a high voltage inactive gas holder (19) so that a supply valve (18) may be straddled, and to prepare a valve with an actuator with a small capacity in this by-path pipe from a supply valve (18). These valves are also connected to the program controller (22). If it carries out like this, it will be a quenching room (2). Fine adjustment of internal pressure is attained.
[0017]
[Effect of the Invention] According to the quenching equipment of this invention, the above-mentioned cooling curve can be changed to arbitration, without changing the class of cooling agent. Therefore, also when a processed material covers many forms, the quality according to this can be given to each processed material.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the outline front view showing the example of the quenching equipment of this invention.
[Drawing 2] It is the outline side elevation showing the example of the quenching equipment of this invention.
[Drawing 3] It is the graph which shows the cooling curve at the time of changing the pressure of the quenching interior of a room.
[Description of Notations]
2 Quenching Room
8 Quenching Coolant Tub

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* NOTICES *

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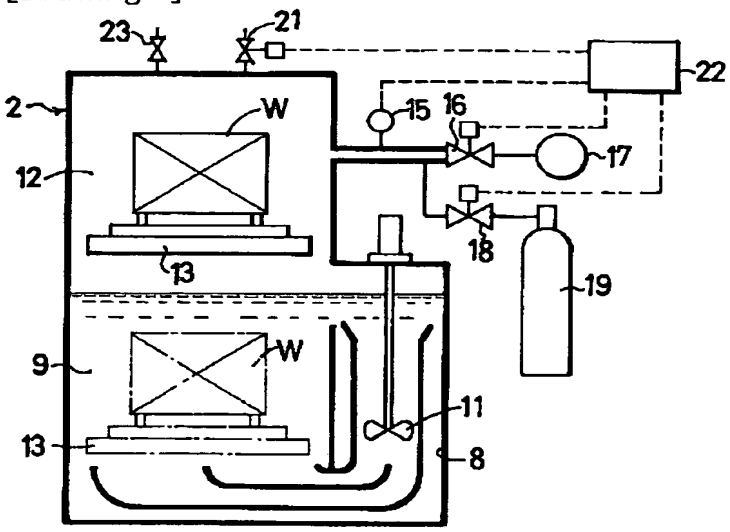
damages caused by the use of this translation.

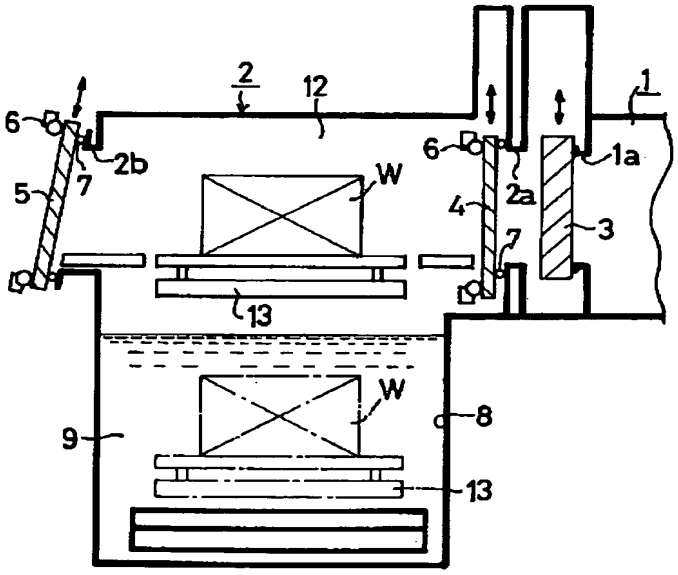
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

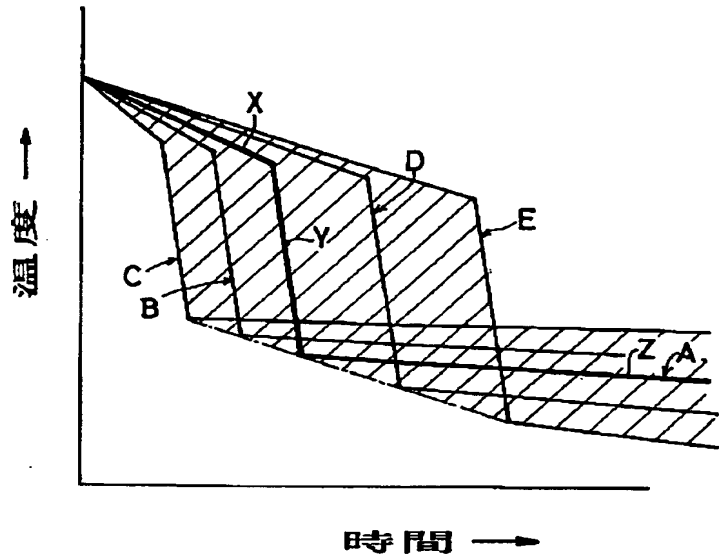
[Drawing 1]



[Drawing 2]



[Drawing 3]



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